

REMARKS

The present application was filed on May 26, 2006 with claims 1 through 29. Claims 5, 6, 20, and 21 were cancelled in the Amendment After Final Rejection dated April 10, 2009. Claims 1-4, 7-19, and 22-29 are presently pending in the above-identified patent application. Claims 1, 16, 26, and 29 are proposed to be amended. A Request for Continued Examination is being submitted herewith.

In the Office Action, the Examiner rejected claims 1-11, 13-15 and 16-25 under 35 U.S.C. §103(a) as being unpatentable over Perahia et al. (United States Patent No. 7,352,688) in view of Li et al. (United States Publication No. 2004/0258025), rejected claims 1-29 under 35 U.S.C. §103(a) as being unpatentable over Gardner et al. (United States Publication No. 2005/0233709) in view of Li et al., rejected claim 12 under 35 U.S.C. §103(a) as being unpatentable over Perahia et al. in view of Li et al., and further in view of Gardner et al., and rejected claims 26-29 under 35 U.S.C. §103(a) as being unpatentable over Perahia et al. in view of Gardner et al., and further in view of Li et al.

The Examiner is thanked for the courtesy of an interview on June 29, 2009, where the present claim amendment was discussed. No agreement was reached.

Independent Claims

Independent claims 1, 16, 26 and 29 were rejected under 35 U.S.C. §103(a) as being unpatentable over Li et al. and Perahia et al. or Gardner et al., or a combination thereof. In the Advisory Action, the Examiner asserts that introducing a phase (shift) to each of the long training symbols relative to one another is an inherent feature in OFDM.

Applicants note that independent claims 1, 16, 26 and 29 have been amended to require *wherein each of said long training symbols are time orthogonal by introducing a phase shift between at least two of said training symbols transmitted on one of said N transmit antennas*. In the text previously cited by the Examiner, Perahia teaches “blocks 205 shift the frequency and phase of the received signal based on the measured offsets for synchronization to local timing.” (Col. 4, lines 49-51.) Also, in the text cited by the Examiner, Gardner teaches:

[0044] In this method, enough of the signal is received to identify what should be the two repeated long training symbols, typically sampled as two identical repetitions of 64 samples for each receive antenna. An FFT (fast-Fourier transform) of the sum of the two identical repetitions of 64 samples is taken, generating an output sequence $s_i(k)$, comprising 64 complex values per receive antenna, containing channel amplitudes and phases, as well as phase shifts caused

by the long training symbol sequence that was actually used (e.g., sequences such as L₁, L₂, L₃ or L₄).

5 [0070] A MIMO transmitter can have two or more transmit antennas (or antenna arrays, as the case may be). For a MIMO system with two transmit antennas and two different transmit data streams, preferred values for the cyclic delay values d_k are 0 and 32 samples, respectively. This corresponds to a cyclic delay of 1.6 microseconds between the two transmitters. For three transmitters, d_k can be 0, 22, and 43 samples, respectively. For four transmitters, d_k can be 0, 16, 32, and 48 samples, respectively.
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Applicants find no disclosure or suggestion in Perahia and Gardner that *each of said long training symbols are time orthogonal by introducing a phase shift between at least two of said training symbols transmitted on one of said N transmit antennas.*

15 Regarding the Examiner's assertion that introducing a phase (shift) to each of the long training symbols relative to one another is an inherent feature in OFDM, Applicants respectfully disagree and note that the Examiner has not provided evidence to establish this assertion. In any case, *introducing a phase shift between at least two training symbols transmitted on one of N transmit antennas* is not inherent in OFDM.

20 Applicants also note that independent claim 16 has been amended to require a transmitter circuit and that independent claim 29 has been amended to require a receiver circuit. Support for this amendment can be found in FIGS. 1 and 8 and the associated text.

25 Thus, Perahia et al., Gardner et al., and Li et al., alone or in combination, do not disclose or suggest wherein each of said long training symbols are time orthogonal by introducing a phase shift between at least two of said training symbols transmitted on one of said N transmit antennas, as variously required by independent claims 1, 16, 26 and 29, as amended.

Dependent Claims

30 Dependent claims 2-4, 7-15, 17-19, 22-25 and 27-28 are dependent on independent claims 1, 16, and 26, and are therefore patentably distinguished over Perahia et al., Gardner et al., and Li et al., alone or in combination, because of their dependency from amended independent claims 1, 16, and 26 for the reasons set forth above, as well as other elements these claims add in combination to their base claim.

Conclusion

All of the pending claims following entry of the amendments, i.e., claims 1-4, 7-35 19, and 22-29, are in condition for allowance and such favorable action is earnestly solicited.

If any outstanding issues remain, or if the Examiner has any further suggestions for expediting allowance of this application, the Examiner is invited to contact the undersigned at the telephone number indicated below.

The Examiner's attention to this matter is appreciated.

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Respectfully submitted,



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